Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

CALCULUS.

Conducted by J. M. Colaw, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

18. Proposed by J. M. BANDY, M. A., Professor of Mathematics, Elon College, North Carolina.

If the ordinate ST of any point T on a circle

$$x^2+y^2=r^2$$

be produced so that $ST.TP=r^2$, prove that the whole area between the locus of P and its asymptotes [and the circle] is double the area of the circle.

I Solution by M. C. STEVENS, M. A., Professor of Mathematics, Perdue University, Lafayette, Indiana; and COOPER D. SCHMITT. Professor of Mathematics, University of Tennessee, Knoxville, Tennessee.

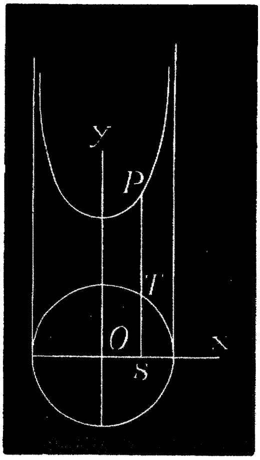
First to find the locus of P: When $ST.TP=r^2$, $PS=y$, $OS=x$, $ST=\sqrt{r^2-x^2}$; $PT=y-\sqrt{r^2-x^2}$. $\therefore (y-\sqrt{r^2-x^2})(\sqrt{r^2-x^2})=r^2$; whence

$y=\dfrac{2r^2-x^2}{\sqrt{(r^2-x^2)}}$ locus of P. The asymptotes are $x=\pm r$.

$$A=\text{area}=4\int_0^r y\,dx=4\int_0^r\frac{2r^2-x^2}{\sqrt{(r^2-x^2)}}\,dx.$$

$$A=4\left\{\frac{x}{2}\sqrt{(r^2-x^2)}+\frac{3}{2}r^2\sin^{-1}\frac{x}{r}\right\}_0^r=3\pi r^2.$$

The area between the curve, its asymptotes and the circle (which was evidently meant) $=3\pi r^2-\pi r^2=2\pi r^2$.



II. Solution by WILLIAM HOOVER. A. M., Ph. D., Professor of Mathematics in the Ohio University, Athens, Ohio; and C. W. M. BLACK, A. M., Department of Mathematics, Wilmington Conference Academy, Dover, Delaware.

Let the co-ordinates of T be (x',y') and those of P, (x,y); then plainly $(y-y')y'=r^2$ ....(1), and from the circle, $y'=\sqrt{(r^2-x^2}$ ....(2).

Eliminating y' from (1) and (2), we have the locus of P given by

$$y=\sqrt{(r^2-x^2)}+\frac{r^2}{\sqrt{(r^2-x^2)}}=\frac{2r^2-x^2}{\sqrt{(r^2-x^2)}}.$$

$$A=\text{area}=4\int_0^r y\,dx=4\int_0^r\frac{2r^2-x^2}{\sqrt{(r^2-x^2)}}\,dx.$$

$$A=4\left\{\frac{x}{2}\sqrt{(r^2-x^2+\frac{3}{2}r^2\sin^{-1}\frac{x}{r}}\right\}_0^r=3\pi r^2.$$

The area between the curve, its asymptotes and the circle (which was evidently meant) $3\pi r^2-\pi r^2=2\pi r^2$.

Also solved by *JOHN DOLMAN, Jr., ALFRED HUME, F. P. MATZ, J. SCHEFFER, H. C. WHITAKER,* and *G. B. M. ZERR.*